

Bruns (g. d.)

# VIVISECTION.

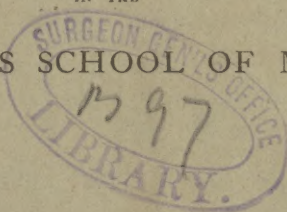
BY

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IN THE

NEW ORLEANS SCHOOL OF MEDICINE.

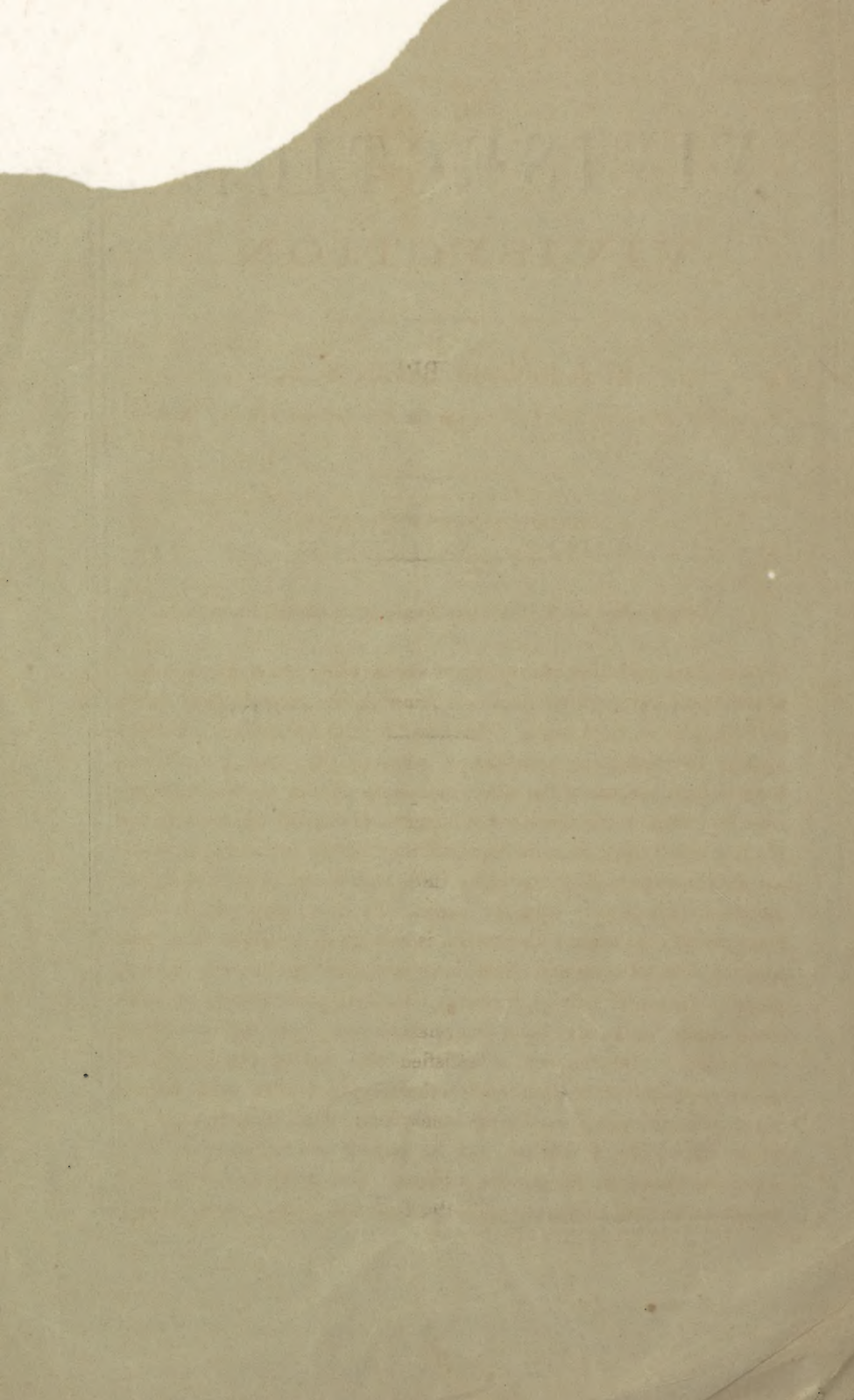


*"Dat veniam corvis, vexat censura columbus."*

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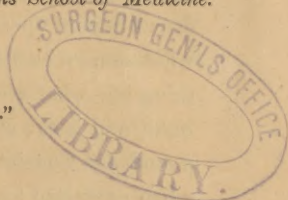
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[ Extracted from the N. O. Southern Journal of the Medical Sciences. ]

ONE of those periodical paroxysms of virtue, which are so characteristic of the moral history of England and America, has recently been raging on both sides of the Atlantic. This time the fit of indignation is directed against the barbarous practices of physiologists; nor has it run the less high because of the utter incapacity of the mass to form any sane judgment on the subject. It is matter of familiar observation that the less men know, the more dogmatic they usually are; and the vulgar are always most readily excited by those appeals which inflame the imagination without addressing the reason. To listen patiently, to deliberate calmly, to decide with caution, is only given to those who, with untiring labor of heart and hands, have struggled up through the long gorge to the serene heights of science; the herd push blindly on in the track of any leader, and fancy their narrow sheep-path the broad highway of truth. But they are not satisfied with having attained the supreme good, unless they can make others enjoy it after their fashion. Your philanthropist lives in an atmosphere of self-complacency that wraps him up like a blanket, and he regards all vision as defective which does not look through his medium. You must see as he sees, and do as he does, or you are no better than one of the wicked. And so





it comes about, that in all large communities little mutual-admiration societies spring up, of persons who having themselves attained perfection, feel called upon to coerce their neighbors into the same beatific state; and under the title of "Peace Societies," "Humane Societies," and "Societies for the Prevention of Cruelty to Animals," are the most arrogant and intolerable intermeddlers with things that they know nothing about, and in which they have no concern. Since they are virtuous, they will have it that there shall be no more cakes and ale in the land.

This modern Pharisee, like his prototype, is very particular about the outside of the platter. No matter what you really are, so long as your outward practices conform to *his* idea of decorum. You must crop your hair, you shall wear a particular style of dress, you shall sniffle and drawl in your speech; but you shall not go to a playhouse, or take any wholesome recreation on Sunday, or, in a word, do or leave undone any thing but what seemeth good unto him. He is illumined by an inner light, and is the subject of a higher law, of which he is the infallible expounder. Consistency he sets no value on. Toleration is only a virtue when exercised towards himself. Nor will he make any allowance for the differences that may result from race—influence, hereditation, training, or individual temperament. By these signs you may recognize him in all places and in all times. Change of horizon cannot modify, nor the lapse of ages alter his nature. The child may deny his parent, but he cannot do away with the ~~undeniable~~ likeness of lineament and character. The radical and the reformer shake hands across the broad ocean. Faneuil Hall applauds Exeter to the very echo. The hands may be the hands of Esau but the voice is Jacob's.

Now and then, however, to the great delight of the unbelieving, he runs his head against a wall, and, as Mr. Carlyle said of the Austrians, "mashes his foolish face into pancake against the eternal adamant of things." Such an arrest to his aggressive career he is now meeting with, and it is the object of this paper to add a stone to the barricade which men of science are erecting about the field they have long proved their right to occupy, and which they intend, if possible, to keep sacred from intrusion.

It is now some years since the "Royal Society for the Prevention of Cruelty to Animals," sent a deputation to wait on the Emperor of France, Napoleon III, and to represent to His Majesty the cruelties practiced on animals at the Veterinary School at Alfort. The Emperor promised to institute an immediate inquiry, and accordingly a commis-

sion was appointed by the *Académie des Sciences*, which after examining into the subject, reported a series of resolutions to the Academy in answer to the questions submitted to them. The animated discussion that ensued was closed by M. Gosselin, whose amendment to the report, as follows, was carried :

“*Resolved*, That the complaints of the London Society are totally without foundation. That there is no occasion to take any notice of them. That in the future, as in the past, vivisectional experiments in the Veterinary Schools be left entirely to the judgment of scientific men.”

Having been thus snubbed, the Royal Society next invited an International Congress of all the learned men in the world, to meet in London, for the purpose of discussing the practice of vivisection, and this falling through, it, with noteworthy perseverance, offered in 1865 a prize of fifty pounds for an essay in English, and a premium of one thousand francs for an essay in French, on the following propositions :

1. Is Vivisection necessary or justifiable (when performed as at certain veterinary schools) for the purpose of giving dexterity to the operator?

2. Is it necessary or justifiable for the general purposes of science, and, if so, under what limitations?

Of the eighteen gentlemen invited to act as judges, twelve accepted the office, viz.: The Noble Earl, President of the Society; His Imperial Highness Prince Louis Lucien Bonaparte; Right Hon. and Right Rev. Lord Auckland, Bishop of Bath and Wells; Col. F. H. Buckenridge; Frank Buckland, Esq., M. A.; Dr. Carpenter; J. F. Clarke, Esq., (of the *Lancet*); Dr. Fraser; Prof. Owen; Dr. Quain; Prof. Spooner; Prof. Varnell. And six declined it, viz.: Right Hon. Earl Stanhope; Charles Darwin, Esq.; Prof. Huxley; Dr. Lankester; Prof. Marshall; Prof. Simonds.

At the adjudication, the prize was awarded to Mr. Fleming, Veterinary Surgeon of the Third Kings Own Hussars, for an essay denunciatory of vivisection, either at veterinary schools, or for the purposes of science, under any circumstances. But as another essay was only in a minority of one vote, a second prize was subsequently given by the Committee to its author, Dr. Markham, F. R. C. P., Physician to St. Mary's Hospital, and formerly Lecturer on Physiology and Anatomy at St. Mary's Hospital Medical School, who approved of vivisection as the soundest means of determining physiological questions, when intelligently and legitimately conducted. It is not difficult to guess what members of the Committee concurred in his views.



In obedience to that law of mutual commendation and quotation which we have said is characteristic of such bodies, the New York "Society for the Prevention, etc.," has very recently uttered its protest against the horrors of vivisection, in a paper couched in that inflammatory style, and dealing in that reckless assertion, which usually stands the ignorant in place of argument.

Although this is a question which scientific men, if not solely concerned in, are alone competent to decide, we are now put upon our defence before the public, and are bound to show that the charges of wanton and useless cruelty to the helpless subjects of our experiments, are not founded in fact.

Dr. John C. Dalton, Professor of Physiology in the New York College of Physicians and Surgeons, has indirectly replied to Mr. Bergh, President of the New York Society for the Prevention of Cruelty, etc., in a paper read before the New York Academy of Medicine. It was eminently proper that it should come from one of the most accomplished physiologists in America, who is not merely the most successful cultivator and teacher of his branch by the experimental method, but a gentleman widely esteemed and beloved for his many amiable qualities. The paper itself is a well considered digest of the obligations which our science owes to experimental physiology; and if we are obliged ourselves to travel over a part of the same ground, it is an additional proof how thoroughly incorporated those truths are with the history and progress of medicine.

Mr. Fleming's is the first attempt we have met with at a methodical statement of the objections to vivisection. Had he confined himself to his own sphere of veterinary surgery, we should have had nothing to say. But when he passes beyond this, and in an essay as remarkable for its ignorance of facts as for its audacity of assertion, exhausts the whole vocabulary of horrors in his vituperation of experimental physiology, we are forced to retort. Not that the imprimatur of the Royal Society makes it any the less ridiculous; but only that it is the more dangerous to a not inconsiderable class who attach great weight to authority.

To dispose very briefly of the first section of Mr. Fleming's essay, we agree with him that the cutting, tearing and burning of living horses for the sake of acquiring surgical dexterity, which can be as well done, to say the least, on the cadaver, is wholly unwarrantable. We reprobate, as all physiologists do, the infliction of unnecessary pain, when the end sought is at best doubtful, and can be obtained by methods not open to the objection of inhumanity. No one, indeed, has so great an interest

as ourselves in suppressing all wanton cruelty to animals, under whatever guise; for aside from that sentiment which we may be supposed to share with all humane persons, it is this abuse of a scientific method which brings reproach upon a most efficient and praiseworthy means of research. But to assert, as the Royal Society does, that "in so far as it concerns animals, it matters not whether the tormentor is a man of high degree or thoroughly debased—whether he is moved by noble purposes or governed by brutal instincts—the sufferings of the dumb, defenceless, sensitive creatures are the same," is almost too absurd a proposition to challenge. The same argument would reduce every surgical operation for the cure of disease or to save life, to the same level with the torture inflicted on his victim by the North American savage, "because the sufferings are the same." A person unused to such sights might turn away sickened from the excision of a cancerous breast, or the Cæsarean section, but it is difficult to conceive of any one so weak-minded as to condemn the operation, "because he could not witness the practice of surgeons, (for *surgeons* read "physiologists, known as vivisections") without a shudder of pain." There are clearly cases constantly arising in our profession, where the maxim, doubtful in morals, that "the end justifies the means," is indisputable. Or, does any one accuse of criminal murder or suicide the general who orders a thousand men on a forlorn-hope; though he believes their destruction to be inevitable; the martyr who goes to the stake rather than renounce his creed; the woman who deliberately takes her own life to escape a nameless shame, preferring death to dishonor?

Setting aside then the veterinary question as one which does not concern us, except as men not wholly devoid of sensibility, let us examine the charges brought against experimental physiology. Without entering into unnecessary detail, these may be reduced into two categories.

First, that it is cruel, and tends to debase the mind and blunt the sympathies of those who pursue it.

Second, that so far from having led to any valuable results, it has been the source of great error and confusion.

For the sake of convenience we shall consider the last of these propositions first.

Experimental physiology, which in its true sense embraces a variety of procedures besides vivisection, has for its object to determine the functions of organs and their mutual relations. If it be asked what it has accomplished, we answer, that there is not an important fact known concerning the dynamics of the human body which it has not either discovered or illustrated. And first let us interrogate the



*Nervous System.*—Mr. Fleming, in a facetious vein, calls up the shade of Galen—the caustic satirizer of empirics in his own day—to deride “the burlesque philosophy” which applies the questionable results of experiments on rabbits, pigeons, guinea pigs, etc., to an elucidation of the complex phenomena of life in man. Yet up to the time of Galen, says Prof. Owen, while “observation showed the course of a nerve or a tendon to a mass of flesh, it did not own what they did to such mass, now termed muscle. The closest and most persevering observation of the phenomena in the dead body, could only teach the invariable relations of the nerve or tendon to the muscle. When the idea occurred to the Alexandrian physiologist to divide, in the living animal, the several kinds of white cords, called *neura* by his predecessors, then, and then only, was his science enriched with the power of distinguishing true nerve from tendon, ligament, etc.” It was by experiment too that Galen first determined the function of the recurrent laryngeal, and showed its relation to phonation. If the physiology of the nervous system slept a dreamless sleep for centuries after his time, it was owing, not so much to the intrinsic obscurity of the subject, as to the neglect of the only method by which it could be successfully approached. The rich results obtained within the last forty-five years; our knowledge of the reflex function of the spinal cord; of the different attributes of the anterior and posterior roots, and their decussation in the cord; of the true distinction between ganglionic centers and nerve trunks; of the regeneration of nervous structures; of the functions of the cranial nerves; of the sympathetic system, the medulla oblongata, the sensory ganglia, the cerebellum; of the transmission of sensory and motor impressions, and their rapidity, and a mass of facts concerning general and special sensation, have been wholly due to experiment; imperfectly and obscurely aided by the testimony of our own consciousness, and the manifestations of disease. As if the case had been made on purpose to illustrate the valuelessness of mere observation, twelve years after Sir Charles Bell and Magendie had demonstrated by vivisection the different endowments of the spinal roots, Mr. Walker, of Edinburgh, published his claim to priority of discovery, asserting that he had theoretically shown that the *anterior* roots were *sensory*, and the *posterior*, *motor*—just the reverse being true. And he goes out of his way to revile as dolts or drivellers those who rely on experiment, falsely imagining that eyes and fingers can be a substitute for brains. Now—*nomine mutato, de se fabula narratur*. Shall we turn to

*Respiration?* What do we know of its nervous centres and excitors;



of its essential nature ; of the reason why a limited volume of air in which an animal is confined, diminishes in volume and becomes unfit to support life ; of the atmospheric element which disappears under these conditions ; of the nature and causes of asphyxia, of its relation to the rate of life, temperature, age, etc., which is not entirely due to experimental research ? If we take up the subject of

*Digestion*, the answer is still more emphatic. As an illustration of Mr. Fleming's knowledge of the history of physiology, and his capacity to sit in judgment on its evidence, we will quote a single paragraph from him : "Reaumur," he says, "observing digestion only in birds, which have a strong muscular gizzard, came to the conclusion because this organ was capable of grinding hard substances, that trituration was the essential principle of digestion. To study digestion as it is in man, what wisdom is there in experimenting upon a ruminant animal, with three or four stomachs to digest a vegetable diet, a carnivorous animal with a stomach adapted only for flesh, or a creature that feeds almost exclusively on grains. And yet we find that Sir Astley Cooper drew his deductions from experiments on the dog, a carnivorous animal, and applied them to man, an omnivore. When noticing digestion, I may call attention to the opposite results which vivisectors have obtained in their experiments upon it. A most inhuman man, a Dr. Brachet, divided the pneumogastric nerves in a dog, after allowing it to become ravenously hungry, and found that it had lost all desire for food. Dr. Reid, of Edinburgh, repeated the experiment several times, but without success."

Now the facts are, that up to the time of Reaumur, the act of digestion was supposed to be purely mechanical ; it being thought that the stomach ground down the food to a pulp by its motions. Reaumur at first shared this view, but afterwards put it to the test of actual experiment, by making a dog swallow hollow perforated balls containing meat. After allowing these to remain in the stomach for some hours, he withdrew them by means of an attached thread, and found that the meat had disappeared. Varying the time during which the balls were suffered to remain in the stomach, he demonstrated that the meat was as fully, though more slowly digested, as when not so protected ; and that digestion was accomplished therefore by the action of the solvent juice of the stomach, and not by any mechanical power, the action of the gastric juice beginning on the outside of the bolus and gradually reaching the centre.

Whatever error Sir Astley Cooper may have been led into, from not

taking into account the nature of the animals he experimented on, was one not unlikely to occur with a pioneer in this field, but is scarcely possible to be overlooked by a physiologist of to-day. Since Cooper's time, the labors of Lehmann, Corvisart, Koopman, Brucke, and others, have shown that while the strongly acid gastric juice of carnivora is best adapted to dissolve animal albumen, the weaker acid of the herbivora accomplishes the solution of vegetable albumen or gluten with much greater facility. A very useful guide in prescribing the diet of persons whose stomachs are in an enfeebled condition.

The results of Dr. Reid's experiments on the effects of section of the pneumogastric, which have since been corroborated by Bidder and Schmidt, so far from negating those obtained by Brachet, confirmed them. For they showed that the digestive power was suspended for some days, but recovered itself eventually if the animal survived the shock of the operation.

How far the secretion of the gastric juice is under the control of the nervous system, or by what channel such influence is conveyed, is still matter of discussion. The well known effect of mental emotion, as of sudden and intense grief or joy, in putting an immediate stop to the digestive process, shows that some such influence is exercised; and much of the contrariety observed in the results obtained by different experimentors, may be owing to the point at which the pneumogastric is cut—whether above the inferior laryngeal, and so affecting the respiration, or at the œsophageal opening, involving section of the sympathetic. "Seven out of Dr. Reid's experiments," says Dr. Carpenter, "were performed before he obtained any evidence of digestion after the operation, and the four which furnished this followed one another almost in succession. So that it is easy to understand why those who were satisfied with a small number of experiments, should have been led to deny it altogether."

As if to rebuke physiology for its want of boldness in interrogating Nature directly, when her processes are hidden from sight, a rare accident gave Dr. Beaumont an opportunity of studying gastric digestion in the person of Alexis St. Martin, in whom a gastric fistula had been established, as the result of a gunshot wound which carried away a portion of the abdominal wall. To those observations our science is incalculably indebted; and by imitating, on animals, the same kind of experiment which had at first been accidentally performed on man, we have corrected the errors into which Dr. Beaumont fell, and can now give an almost perfect account of the whole process of stomach digestion.



Our knowledge of intestinal digestion rests absolutely upon experimental research. For as the pancreatic fluid and the bile are emptied close together into the upper part of the intestinal canal, it is only by obtaining these secretions separately, through pancreatic and biliary fistulæ, that we can study their nature, and their influence on different articles of food. And by the same method we have learned all that we know of the phenomena of absorption, the office of the lacteals, the changes which take place in the chyle during its passage through the mesenteric glands and thoracic duct, the function of the spleen, the physiological relations of the portal circulation, and the glycogenic function of the liver. All the truths concerning the

*Circulation*—that the arteries are blood-carriers, like the veins, and not filled with air; that the blood coming to the right side of the heart passes round to the left side, by performing a circuit through the pulmonary vessels, and not directly through an interventricular septum; the direction in which the blood flows through the veins; the uses of the valves in those vessels; the nature and object of the heart's movements; the coincidence of its systole with the transmission of blood through the arteries, of its diastole with the delivery of blood to it through the venæ cavæ and the pulmonary vein; the continuity of the arterial and venous circulations; the rate of movement of the blood and the degree of pressure exercised by it in different parts of the vascular system; the forces which maintain the capillary circulation; the peculiarities of the circulation in the lungs, in the portal system, in the brain, and the modifications produced in the latter by variations in the general conditions of the circulating system, could not possibly have been ascertained in any other way than by direct experiment on living animals.

Such is briefly an outline of the principal discoveries which physiology has made, by means of its most valuable and trustworthy means of research, *vivisection*. To enter into the detail which some demand, would be to write a history of medical science. For this we have neither the space nor inclination. It has been done, and well done, again and again, until the story is as tedious as a twice-told tale. Nor is there any inducement to enter the lists against a class of sciolists, who, finding it easier to doubt than to examine, puff away the strongest evidence with a contemptuous sneer.

To estimate its value, is only to become acquainted with the progress of medicine in all its departments, a progress indissolubly bound up with the advances of physiology and anatomy. He has but slight appreciation of the scientific spirit who asks of any knowledge, "what advan-

togeth it?" The discoveries which have been of greatest usefulness to our race were not made with any reference to their utility. They have always been unconscious workers, building better than they knew, simple-minded and single-hearted men, loving truth for its own sake, to whom God has given "the vision and the faculty divine." Very rarely has it been vouchsafed to them to reap the fruit of the seed they sowed. But all history is full of examples of the benefits which have accrued from the application of truths which seemed at first to be but barren and isolated facts. Those who believe all knowledge to be useful as a discipline, as well as a means to an end, will pursue its acquisition without stopping to inquire what result will come of it; the while not unaware, that from the storehouse of facts which the toil of centuries gathers is supplied the material for those wide generalizations by which great principles are afterwards evolved and great laws established.

The fact is, that so far from overestimating, it is difficult for us fully to appreciate the service which medicine has derived from this department of science. Her greatest discoveries have become so incorporated with our elementary knowledge, which they underlie, that, like the air we breathe, the water we drink, they seem cheap and common. But if any one could strip himself of all that he has learned through "experimental physiology," he would stand aghast at his ignorance of the simplest guides of practice, and the most trivial facts of pathology. This, which is impossible to individual experience, can be accomplished by a comparison of the unknown and unstable ground on which our predecessors of only the last century stood, with the secure and firm footing we now enjoy. Without an acquaintance with what experiments on living animals have taught us of the nervous system, of respiration, of the circulation, of digestion, of nutrition, of animal parasites, what would we know of hysteria, of paralysis, of tic douloureux, of those sympathetic disorders of organs which make up so large a part of the phenomena of disease. We would still be cutting the seventh pair of nerves for facial neuralgia, and bleeding, blistering, firing and purging anæmic women for fancied spinal lesions. Our operation for the cure of aneurism would still be irrational and mischievous. We would be in utter darkness as to the cause of asphyxia, and therefore unacquainted with the means of restoring life through artificial respiration. The phenomena of inflammation would remain a hidden mystery; the diet and regimen of the sick be regulated by custom and caprice, and a case of trichina disease, mistaken for acute rheumatism, would fill us with amazement at its intractable nature and fatal termination. These constitute some of



the more obvious errors which a sound physiology has corrected; but our art is so wholly indebted to her for all of accuracy that it can boast in diagnosis, pathology and treatment, that, as we have already said, to consider the subject in detail would be to expand an essay into a volume. Rational medicine recognises in "experimental physiology" not merely a willing, accomplished, and untiring servant, but an *alma mater et nutrix*. When, therefore, it is affirmed that vivisection is useless for the purposes of science, we need only turn to the history of medicine, every page of which illustrates its immeasurable value, to set the seal of falsehood on the assertion.

But it is further alleged that it has led to much error and confusion. This was at first inevitable. It has for its object to discover the functions and relations of the various organs of the human body. Its experiments, therefore, must be performed on those animals most nearly allied to man in the scale of being. Now the higher we rise in that scale, the more complex we find the organization to be, and the difficulty of securing the necessary conditions for isolating the special function that happens to be under examination, from the disturbing influences of other organs, increases *pari passu* with its importance to the life of the whole. From the accumulated experiences of others, as well as our own, we gradually learn to separate what is accidental and variable from what is essential and constant. Whatever errors may have arisen are corrected, whatever truths may have been elucidated are confirmed by the labors of our co-workers; and thus, by accretion of knowledge, acquired tact and dexterity in method, and finer and more numerous instruments of research, we gain, day by day, that skill and confidence which give increasing accuracy and value to our labors.

If he who asserts that physiology has performed no useful work, is ignorant of the history of medicine, he who charges it with uncertainty is ignorant of the history of science.

All the sciences have passed through certain phases, which are not merely a part of their common history, but an expression of those fixed conditions of human thought in obedience to which every system of philosophy has evolved itself. The organical sciences have proved no exception to this universal law of growth. The fundamental ideas, upon a proper appreciation of which the development of each depends, are at first but vaguely apprehended. Only by slow degrees do the conceptions arising from these distinctly shape themselves, and not until they have been worked out with perfect precision are those positive truths discovered which make possible the successive generalizations that crown and complete the work.

It follows then, if each science is based upon certain fundamental ideas, themselves containing the elements of those truths which the science afterwards develops and formulates, that its certainty will depend on the correct apprehension of the conceptions involved in these, and its progress on the demonstration of their accordance with observed facts. But where general laws have to be deduced from isolated phenomena, and true theories constructed on limited data, in attempting to unfold the fundamental idea, large space for error must of necessity exist; more especially as the first advances have to be made through hypotheses alone. As experience corrects the faults, and observation points out the deficiencies of these, the circle is gradually narrowed, until a point is finally reached from which a more certain method of progress becomes possible.

This, which is true of all the inductive sciences, has also been the history of physiology—with this difference, that the greater complexity of the phenomena with which she has had to deal, and, by consequence, the deeper profundity of their laws, has assigned her a lower grade of progress than has been attained by those sciences whose relative simplicity has made possible, thus far, a higher degree of development.

Much time, we admit, has been wasted in a fruitless attempt to form a distinct conception of life, and to discover the causes of vital action. And it was a great step taken in the right direction when physiology, abandoning this hopeless search, began the examination of the vital functions separately, with a view to determining those relations of similitude and succession which are denominated laws. But as such a movement implies a scientific classification, and as any effort to decompose so complex an idea as life, presupposes an extensive acquaintance with the relations of individual organic actions to the organism, the analysis can never be completed until the totality of the functions is thoroughly comprehended. This is the task to which "experimental physiology" stands pledged, and just in proportion to the activity with which it is prosecuted, will our conceptions of the processes of organic life become correspondingly clear and definite. It is by such a method alone that we can hope to arrive at that ultimate synthesis for which we are now collecting and classing the material. And the splendid triumphs it has won during the last half century, demonstrate beyond a shadow of a doubt its certainty and value.

If the method then be correct, what can be said of the means of research. To wait on the infrequent opportunities afforded by "the experiments performed for us by Nature," would be a most tedious and



uncertain labor at best. But this is the least objection that can be brought against it. The graver and insurmountable ones are, that we cannot prescribe the conditions of such experiments, and are left therefore without any method. When the disease is one of an internal organ, moreover, we can never be certain to how great an extent that organ is affected, or whether others are not also involved. The sharp, clean blade of a scalpel, directed by a skillful hand, does its work efficiently and appreciably; but disease is a bungler, not confining its operations to a point of election, but embracing in its erratic processes of irritation, congestion, inflammation and destruction, a wide area of neighboring tissues. To affirm, in one breath, that observation of the phenomena of health and disease is quite sufficient for all the purposes of science, and in the very next to raise the objection against experimental physiology, that its results are so obscured and vitiated by the shock which its surgical procedures occasion that nothing but confusion and error can follow, is monstrous. The vivisector is generally able to predict the amount of shock which an operation will give rise to, and knows very well to wait until this, usually slight, has disappeared. But who can measure the disturbance of the vital forces in disease, when the springs and balances are no longer in harmonious relation, and the whole machine is violently disordered—the nervous system oppressed, the secretions deranged, and the life of all the blood touched corruptibly. The study of morbid phenomena is useful as confirming, illustrating, and occasionally enlarging the knowledge derived from another source; but the very power of interpreting these phenomena correctly is gained from our previous acquaintance with the laws of health, and for this, as we have seen, we are almost wholly indebted to experimental physiology.

We might be content to leave the matter here, considering the charge of cruelty as sufficiently answered in demonstrating the utility of experiments on living animals. For surely it will not be denied that if the knowledge thus gained is of eminent value in lessening human suffering and saving human life, it is legitimately obtained at the expense of pain or death to any number of inferior animals. But as the charge is one of brutality as well as incompetence, it may be worth our while to consider how far it is either true or consistent.

And, in the first place, the pain inflicted in experiments on animals is on the whole very small. Many of them, endowed with an inferior organization, suffer far less than man would from the same amount of injury. Their cries, and struggles, and movements, however purposive

the latter may seem, are not always to be taken as an evidence of suffering. This is a matter upon which only scientific men are competent to pronounce, and it can be proved that in many instances they are nothing more than exhibitions of reflex action. Every one has seen the headless trunk of a chicken, just decapitated, jump about in contortions whose violence would seem to indicate the acutest agony. But the uniform testimony of those who have suffered injury of the spinal cord is, that there is absolute insensibility of all the parts below the seat of lesion, where this has been complete.

If a frog be pricked with a scalpel, it may raise its leg and push away the knife, or hop off. If its head be now cut off and the puncture repeated, it will endeavor to remove the cause of irritation in the same way. If, after decapitation, a drop of strong acetic acid be applied over the internal condyle of the femur, it will wipe away the acid with the foot of the same side, but if this be amputated, it will after some ineffectual efforts perform the same action with the foot of the opposite side; this extraordinary energy of the spinal cord as an independent centre, which is always in inverse proportion to the development of the cerebral hemispheres, is no proof of any special endowment of the cord in the lower animals; nor is the adaptiveness of the movement any evidence that it takes place through the mediation of sensation. The same phenomena are manifested by apoplectic patients and anencephalous infants; and since Marshall Hall directed special attention to the subject, a large number of paraplegic cases have been accumulated, the facts obtained from which, enable us to give a positive affirmation on the subject. Indeed, many of the most complicated actions, requiring the coördination of a great number of muscles, are wholly involuntary, and some of them the will cannot even imitate; as the act of deglutition, which requires that the fauces be stimulated. In the act of sucking, which is perfectly performed by brainless infants and puppies, and in the acts of coughing and sneezing, the muscular combinations are effected without any design.

What blunders unscientific persons are likely to commit when they sit in judgment on such cases, is happily illustrated by Mr. Fleming, who, unconscious of the gentle irony of the anecdote, quotes Dr. Elliotson as saying: "I am sure that the following experiment would have caused Dr. Brachet to be blackballed in any respectable society in England, for a physiologist was blackballed at the Royal Society from the horror excited by an account read just before, of an experiment in which rabbits' heads were crushed, though, *on reflection, it was found that these*



*experiments were unattended by pain, and he was honorably elected on an early occasion."*

In the next place, animals are usually rendered insensible by the inhalation of chloroform, ether, or the smoke of the "puff-ball," before operations are performed on them, and during the experiment, except where the nerves of sensation are the subject of examination; and in the latter cases the determination of the point on which information is desired is soon settled, and the animal put out of pain. Even in such cases the suffering is much less than is popularly supposed, for it is only on irritation of the spinal ends of the nerves that sensibility is manifested, all the parts supplied by such nerves being insensitive after section of the latter.

The popular clamor against the barbarity of slicing, puncturing and lacerating the brain, is a mere waste of breath. So far from inflicting "an amount of torture which the mind shrinks from contemplating," it is unattended by any sensation whatever. The entire organ may be cut away piecemeal without the animal exhibiting any evidence of pain. Nor, like the cerebrum, have the nerves of special sense any endowment of common sensibility. The slightest cut of the skin, the most sensitive portion of the whole organism, gives rise to greater suffering than any amount of injury inflicted on the cerebral hemispheres; but it excites less sympathy because it does not *look* so cruel.

And what can be said of the consistency of those who claim immemorial usage as a sanction for inflicting suffering on birds, beasts and fishes, for pleasure, ornament or support, and deny the same right to the physiologist, though he finds in experiments on living animals the only trustworthy method of enlarging the bounds of a science whose discoveries have been a greater boon to humanity than all the other arts and professions practiced by man.

But "to kill is one thing, to torture quite another," the sentimentalist replies. "The ox dies by a blow on the head, and his sufferings are at a minimum." Suppose we grant that this gentle euphuism about the blow on the head is quite satisfactory as regards the ox; do cattle, sheep, calves, pigs, hogs, as well as oxen, suffer nothing along their road to market, over-driven or penned in suffocating railway carriages, without food or drink, through the long summer day? Are they all killed by a blow on the head? or are not the great majority of them hung up by the legs, to have their throats cut and to die in the convulsions of hæmorrhage? Does the pietist whose heart is torn with cruel indignation at the thought of a sparrow's death under the air-pump, shrink from

the bare sight of a *pâté de foie*, or reject shellfish with horror, mindful of their agonies in the boiling pot? Does the fair, whose conscience is

"So charitable and so pitous,  
She wolde wepe if that she saw a mous  
Caughte in a trappe, if it were ded or bledde,"

ever think with what suffering of snare and gun, and dog, the plume in her bonnet, the sable on her robe, the soft slipper, the delicate glove, the fragrant perfume have been procured?

The Noble Earl himself, President of the Society for the Prevention of Cruelty to Animals, has sometime in his lusty youth ridden to hounds. Perhaps he has felt the exhilaration of "the meet," on some crisp November morning when all the fields were white, and the hedgerows sparkled with the sharpened daggers of the frost. What a glow as the wind rushed by the tingling ear like a storm! What a triumph that double ditch and bank that threw out half the field! And the glorious run when the horses warm up to their work; and the splendid brush at the close; and the maddening cry of the hounds, thirty couple, "deep-mouthed and matched like bells;" and the sudden silence as though every throat were paralyzed in an instant, and the supreme moment in the midst of the wrangling pack, every eye bloodshot with fury, every muzzle eager for a grip of the hated fur. From "breaking cover" to "finish" did his lordship once draw rein to reflect on the torture of the panting and draggled wretch he was hunting to death; or does he hold with the Ettrick Shepherd that the fox enjoys it as well as the men and the horses?

Are any of the members of the Royal Society for the prevention of cruelty to animals, sportsmen? If so, have any of them ever had the curiosity to go through the covers with the game-keeper a day or two after *abattue*? How many birds with broken wings, dying by slow tortures have they picked up? How many hares limping about with mangled limbs, some mortifying, all inflamed and exquisitely painful, have they seen? Or what excuse will be offered for the barbarous amusement of fishing?—have trout and gudgeons and worms no feelings? And if man may claim dominion over the beasts of the field, and may hunt and destroy them, not for food or for support, but for the gratification of taste, or the relaxation of mind, or exercise of body, or in mere wantonness, without reference to the pain he inflicts, shall he be denied the occasional use of them for the advancement of the noblest work that can engage his energies, even though that use involves at times a suffering almost equal to that which the rod, the gun, and the trap inflict?



Out! with such puling sentimentality—such mockery of the divine essence of charity. If the Royal Society wants some real beneficent work to do, let it go down into the reeking slums of Westminster where Lazarus lies in rags, almost at the gate of the queen's palace; or into the still fouler atmosphere of St. Giles and Whitechapel, poisoned with every moral as well as physical abomination; or into the starving districts of East London, and feed the hungry, and clothe the naked, and give light to those who sit in the shadow of death. "Are not these of more value than many sparrows?"

When Christian Englishmen were blowing Sepoys from the mouths of cannon, and murdering Princes in the face of day, and sacking cities with sickening outrages, the Royal Society uttered no protest. Let her batter at the doors of Parliament until the hand is taken from the throat and the knee from the breast of prostrate India, every foot of whose soil has been won by rapine and murder, from the days of Clive to Campbell, India! which, when the British savage was running wild in his unbewn forests, was possessed of a civilization whose magnificence is still attested in the ruins of her gorgeous architecture, the brilliant fragments of her letters, and the mutilated body of a religion whose moral code is only inferior to that which our Master himself taught. When it has purged the common weal of such enormities, we will be more willing to listen to it on the minor canons of the law.

Nor has the child anything to boast of the parent. When a victorious army was making a desert of the fairest garden that ever sun shone on, and cutting through the heart of a State that had suffered more than any other in the cause of American freedom, a swath of such savage desolation as history furnishes no parallel to except in the Carnatic and La Vendee; when every mansion, from the banks of the Savannah to the waters of the Pee Dee was left a blackened heap, and her beautiful capitol laid in ashes; when high-born matrons in the pangs of childbirth were dragged from their beds, to perish with their undelivered babes, without shelter or covering; when old men were tortured to make them reveal where they had hidden their treasure, and some of them hung by the neck until they were dead; when trembling women were robbed with pistols at their bosoms; and cowering children had the last morsel of food snatched from their famished lips, and a whole country was left in beggary and ruins, the Peace Society of New York, and the New York Society for the Prevention of Cruelty to Animals, were silent. But no sooner had the overthrow of the South been accomplished, than the first issued an appeal for aid to resume its labors, which,

with exquisite mockery of its avowed mission, it said "had been suspended during the war;" and the latter, with a view to securing legislation on the subject, addressed a letter to Mr. Agassiz, inquiring "whether turtles do not suffer when turned on their backs?"

And when, on the ninth of March, in the year of our Lord and Saviour, eighteen hundred and sixty-seven—hear it not, ye Heavens! Mr. Trumbull introduced a resolution in Congress, to appropriate a million and a half of dollars for the relief of the famishing South, stating that Gen. Howard, of the United States Army, had appeared before the joint committee to say that unless an appropriation of this kind was made, great suffering would ensue, as the present appropriations were all for freedmen and loyal refugees—the resolution was voted down! Yet such is the wide-spread and appalling destitution, that one Governor tells us there are fifty thousand souls perishing in his State alone for want of corn. And, amid all this, the New York Society for the Prevention of Cruelty to Animals is dumb. Sympathy enough and to spare for foreign rebels and insurgents, for Greeks, and Irish, and Africans—and turtles; but for their starving countrymen, not one crumb! "First cast out the beam out of thine own eye, and then shalt thou see clearly to cast the mote out of thy brother's eye."





